A MOBILE OUTRIGGER SCAFFOLDING SYSTEM

This invention is a continuation-in-part of Provisional Application 60/173,408 filed on December 28, 1999 by inventor Terry W. Cogar entitled "A Mobile Outrigger Scaffolding System," and of a Provisional Application filed on December 26, 2000 also called a Mobile Outrigger Scaffolding System as to which a serial number has not yet been assigned.

FIELD OF INVENTION

This invention primarily relates to the construction industry, especially to buildings that have a structural skeleton with floors, after which phase of construction exterior surface and windows are added. Present technology necessitates the building of scaffolding on the exterior of the structure, often from the ground up. The present invention creates a mobile system mounted on the structural skeleton that furnishes outriggers exterior to the floor and proposed skin of the building, upon which deck planks can be placed, enabling workers to quickly and efficiently access the exterior of the building with construction material, mount or apply the material, and then dismantle the mobile outrigger system and move to a different location on the building. The system is flexible in design to allow work around the exterior corner or edge of a building, or from a horizontal overhang or beam. Once the deck planks and rails are in place, the worker has no need to climb up traditional scaffolding to reach the desired level. The stability and access to the mobile outrigger scaffold in inclement weather or adverse ground conditions is significantly better than traditional ground-up scaffolding and lessens environmental impact adjacent to the structure.

BACKGROUND OF INVENTION

The prior art of most note is well-known and involves the preparation of ground-up scaffolding. Such scaffolding requires a stable surface, and if built from the ground-up, requires access from the ground which is inconvenient in inclement weather conditions. If mounted up the side of a building, substantial effort requiring ample time to assemble and dissemble, and

normally requiring welding, is required if scaffolding is to be based from a floor or stage above ground level.

The assembly of scaffolding itself has risks to workers from failure or falling objects from higher levels of scaffolding. The present invention minimizes any risk in assembly of the mobile outrigger scaffold to the building because a worker is not outside of the building. The setting of deck planks on the outrigger brackets requires attention to safety, but once the deck planks and rails are in place, the worker has no need to climb up scaffolding to reach the desired level. The stability and access to the mobile outrigger scaffold in inclement weather or adverse ground conditions is significantly better than traditional ground-up scaffolding and lessens environmental impact adjacent to the structure.

DESCRIPTION OF FIGURES

Figure 1 shows a basic flat support plate with ends shaped like C-folds and a clamping mechanism, with detail of the clamping mechanism.

Figure 2 has four sub-figures: Figure 2A shows a sample H-beam with identification of the terms used relative to an H-beam in this invention, and the top view of an illustration of a proposed building curtain wall and the typical arrangement of vertical structural H-beams. Figure 2B shows an H-beam with the center section parallel to the proposed curtain wall of a building. Figure 2C shows an H-beam with the center section parallel to the proposed curtain wall of a building. Figure 2D focuses on the corner and the relative change in orientation of the center section and edges of the vertical H-beams relative to the proposed curtain wall of a building.

Figure 3 is a top view of the disposition of the invention relative to a building and vertical H-beam shown in Figure 2C.

Figure 4 shows further detail of a basic bracket plate.

Figure 5 shows a side view of a mobile outrigger scaffold installed on an H-beam awaiting a deck plank.

Figure 6 shows a top view of a flat plate to be disposed adjacent and parallel to the face of an I beam which plate can be used for either a support plate in the mode of the invention set on H-beams with the center section parallel to the proposed curtain wall of a building or as a support plate for a bracket plate in the mode of the invention set on H-beams with the center section perpendicular to the proposed curtain wall of a building.

Figure 7 shows a side view of the plate in Figure 6.

Figure 8 shows an L-fold mechanism mountable on a vertical steel tube column.

Figure 9 shows a C-fold mechanism which C-fold has an interior portion that is sufficiently large to encompass a face of a vertical steel tube column.

Figure 10A shows a side view as mounted on a beam (beam not shown) with a safety plate mounted on the invention, and shows an additional set of cylindrical protrusions which can be mounted on the safety plate. Figure 10B shows the opposite side the interior of which side is referred to in the description as the flat side. The pins for the safety plate are shown as hidden.

DESCRIPTION OF INVENTION

The essence of one preferred mode of the invention begins primarily for vertical column structures with a flat plate that has ends shaped like C-folds on the shorter edges of the plates, as opposed to the longer edges, as in Figure 1. A line perpendicular to the longer edges will be oriented vertically. A line perpendicular to the shorter edges of the plates will be oriented horizontally and will be a horizontal axis. The plate may be formed, cast or forged. A typical plate would have shorter edges 6-8 inches long. A typical H-beam is 9 inches wide on the end face of a vertical H-beam.

This preferred mode of the invention uses the edges of a vertical column in the shape of an H-beam standing on end as shown in Figures 2A-2D. The ends of the flat plate are shaped like a C-fold which C-fold has an inside perimeter which can fit around the edge of a vertical column H-beam. The distance between C-folds should be sufficient so that when one C-fold is situated on one edge of a face of an H-beam, the other C-fold with a clamping mechanism inside can be situated around the opposite edge. Inside at least one of the C-folds is a clamping mechanism, normally consisting of a metal piece, which could have an indentation in it and would be driven by a screw mounted through the C-fold. The clamping mechanism can be a nut welded to a screw to grip with a wrench, which screw passes through a nut welded or embedded in the C-fold through which the screw passes to a mechanism with a rotationally flexible or weaker end so the screw can put pressure on a clamp face applied to the edge of an H-beam. A levered clamping mechanism could also be employed to direct force against a beam and pull the opposite C-fold securely against the vertical H-beam as shown in Figures 1 and 5.

When the plate is set facing on the vertical H-beam with the C-fold edges cupped around cupped around the end face of the vertical H-beam, the clamping mechanism is tightened, and one C-fold is pulled more tightly into the beam while the C- fold with the clamping mechanism grips the opposite side resulting in a firmly mounted plate on the vertical H-beam.

From this basic plate design, the best mode of the invention works in two parallel ways. In the first mode, if the center section of a vertical H-beam is basically parallel to the proposed outer curtain wall of a building, the best mode is the use of a plate with perpendicular cylindrical protrusions supporting a bracket as in Figures 1 and 5. In the second mode, if the center section of a vertical H-beam is basically perpendicular to the proposed outer curtain wall of a building, then the best mode is the use of three plates also referred to as a triad of plates.

For proceeding around the corner of a building, assuming for the moment the center sections of all vertical H-beams are oriented in the same direction, then a combination of the first and second modes is appropriate.

The basic support plate for the first mode has on it two cylindrical protrusions which will

be opposite the side of the plate placed against the H-beam as shown in simplest form in Figure 1 and more complex from in Figure 7. These cylindrical protrusions may be smooth protrusions to facilitate a support bracket or deck bracket being slid on the protrusions. Normally, a retaining pin on the protrusion would prevent the support from sliding off. Alternatively, the protrusion could be a bolt. Normally, a retaining pin or a nut on the protrusion that is a bolt would prevent the support from sliding off. Ridges or notches could be used to prevent the support from sliding off.

One of these support plates mounted on an H-beam then has a horizontal bar with holes in it mounted so the horizontal bracket protrudes out from the plate mounted on the H-beam. The horizontal bracket is then exterior of a proposed outer curtain wall of a building. The bracket can have a deck plank placed on it and functions as a walkable deck in combination with another plate on the next H-beam over in a building. Similarly, two plates, over and under, with one protrusion could be used. However, for safety reasons, it is preferable to use two plates on each H-beam, each with two perpendicular protrusions and use a bracket type of support on each set of two plates on each H-beam. A bracket type of support could be an upper horizontal bar with holes for the cylindrical protrusions on the interior end of the upper horizontal bar with a lower angle bar with a horizontal end having holes underneath the upper horizontal bar holes, with the angle bar supporting the outside end of the upper horizontal bar. This can also be referred to as a deck support. Further bracing can be put on the bracket type of support. The horizontal bar or the bracket type of support would normally have an upturned end to prevent a deck plank from inadvertently sliding off which upturned end is opposite the end with the holes to mount the bracket type of support on the protrusions on the plate as seen in Figure 5. Two sets of two plates with bracket type of supports on adjacent vertical H-beams, and a deck plank placed on them, and a restraint on the protrusions provide a stable, mobile outrigger scaffold with deck plank which permits access to the exterior of a building to conduct activities on the outside of the building such as installing curtain wall, windows, painting and the like as seen in side view of a mounted bracket in Figure 5.

The invention recognizes that not all vertical H-beams will be oriented with the center section parallel to the curtain wall. For vertical H-beams with the center section generally

perpendicular to the curtain wall, the second mode and a set of three plates using a plate somewhat like the first plate and a modified set of two other plates is used as illustrated in Figure 3.

In the second mode, again starting with the basic plate design, a support plate is used. This plate has cylindrical protrusions mounted on one end *parallel* to the horizontal axis which will be called support protrusions. These protrude from the edge of the plate adjacent to the C-folds. The support protrusions are thus *parallel* to the flat surface of the plate. When the plate having the C-fold shaped ends is mounted on the vertical H-beam with the center section perpendicular to the curtain wall, the support protrusions run parallel to the proposed curtain wall. A first support plate is mounted on the outside face of such a vertical H-beam, and a second support plate is mounted on the inside face of such a vertical H-beam, by tightening the clamping mechanisms.

For the second mode, a third support plate, also referred to as a bracket plate, as shown in Figure 4, is made with apertures in it adjacent to the short edges of the plate to accommodate the support protrusions of the first and second plates. This third support plate would normally not need to have C-folds or a clamping mechanism. The third support plate would have cylindrical protrusions perpendicular to the flat surface of the plate.

The support protrusions of the first and second plates are shown in top view in Figure 6 and side view in figure 7; if the first and second plates have cylindrical protrusions perpendicular to the flat surface of the plate, as in Figures 6 and 7, the plate is more versatile and can be used as the plate in the first mode of the invention, and the deck bracket mounted on the cylindrical protrusions.

By placing the first of these three plates on the face of the vertical H-beam, and mounting it as before, and placing the second plate on the opposite face of the vertical H-beam, and mounting it as before, and placing the third support plate on the support protrusions, the concave portion of the vertical H-beam is spanned by the third support plate, and protrusions exterior to the outline of the vertical H-beam are presented and available on which to mount the bracket

type of support which will protrude outside the curtain wall. Figure 3 illustrates this mounting. Again, the invention can be revised so there is only one support protrusion to hold a third support plate and two protrusions from the side opposite the flat side of the plate, but for safety's sake, normally an upper set of three plates, and a lower set of three plates would be used on each vertical H-beam, and a second upper and lower set on an adjacent vertical H-beam. The bracket type of support or deck bracket is mounted on the upper and lower set of plates on each adjacent vertical H-beam, and restraints are placed on the cylindrical protrusions to prevent the bracket type of support from inadvertently coming off. With a deck plank placed on the bracket type of support, a stable, mobile outrigger scaffold with deck plank permits access to the exterior of a building to conduct activities on the outside of the building such as installing curtain wall, windows, painting and the like.

A further distinct advantage is obtained by the set of plates from the first mode of the invention and two triads of plates from the second mode of the invention. At the corner of a building, using the corner vertical H-beam, and two adjacent vertical H-beams (all three H-beams with the center section facing the same way as in Figure 2D), a first set of triad plates is mounted on the adjacent vertical H-beam having a center section perpendicular to the proposed curtain wall. The second triad is mounted on the exterior two sides of the corner vertical H-beam, and on the third side toward the just-referenced one of the two adjacent vertical H-beams. With the first mode of invention mounted on the remaining adjacent vertical H-beam having a center section parallel to the proposed curtain wall, and lower identical set of plate(s) placed on each vertical H-beam, and brackets set on the cylindrical protrusions as shown in Figures 3 and 5, deck planks set on the brackets enable access exterior to the building and around the corner to conduct activities on the outside of the building.

In addition, the invention is easily dissembled or assembled by a single person, can be carried by a single person, and moved around a floor, or from floor to floor as construction progresses. Normally the setting of the deck plank would require two sets of hands, but by sliding it onto one bracket, and then lifting the opposite end onto an adjacent bracket, one person can set the deck plank. Alternatively the deck plank can be slid onto an adjacent bracket from an already mounted deck plank.

A third preferred mode of the invention uses the same principles as the just-described mode, but proposes that the flat plate that have ends shaped like L-folds on the shorter edges of the plates, as opposed to the longer edges, as in Figure 8. A line perpendicular to the longer edges will be oriented vertically. A line perpendicular to the shorter edges of the plates will be oriented horizontally and will be a horizontal axis. The plate may be formed, cast or forged. This mode has the special utility of being able to be mounted on vertical columns without an H-shape, i.e., vertical columns that are square or rectangular. Another modern construction method is to use square steel tubes and face them with fireproofing. After the skeleton of a building has been built, and the floor base structure is in place, and even after fireproofing, the invention, by stripping a foot or so of the (usually blown-on) fireproofing, can be mounted temporarily on a vertical column. The pressures are such that the invention, once mounted by the tightening of the clamping mechanism, mounted through the L-fold, remains securely on the column and functions as the first and second modes. The remaining plates of the invention are mounted as before and the cylindrical and support protrusions are mounted as in the earlier modes. Again, the clamping mechanism can be a nut welded to a screw to grip with a wrench, which screw passes through a nut welded or embedded in the L-fold through which the screw passes and a mechanism with a rotationally flexible or weaker end so the screw can put pressure on a clamp face applied to the edge of a steel tube. With the plates of the invention as before and the cylindrical and support protrusions as before, the L-fold design referred to in this paragraph is equally useful around the corner of a building built with square or rectangular vertical steel tube columns.

A fourth preferred mode of the invention combines the characteristics of the earlier modes. In this mode, a C-fold plate is designed that a flat plate that has ends shaped like C-folds on the shorter edges of the plates, as opposed to the longer edges, as in Figures 1 and 9. A line perpendicular to the longer edges will be oriented vertically. A line perpendicular to the shorter edges of the plates, and parallel will be oriented horizontally and will be a horizontal axis. The horizontal axis will run from what is normally viewed as the front to the back of the vertical steel tube structural column, and the front C-fold to the back C-fold of the invention. The plate may be formed, cast or forged. A typical plate would have shorter edges 6-8 inches long. A typical

H-beam is 9 inches wide on the end face of a vertical H-beam.

This preferred mode of the invention uses the entire square or rectangular vertical steel tube column standing on end as in Figure 9, either in steel tube form or as an H-beam, but more often in vertical steel tube construction. The ends of the flat plate are shaped like a C-fold which C-fold has an inside perimeter which can fit around the face of the steel tube vertical column. The distance between C-folds should be sufficient so that when one C-fold is situated on one face of a vertical steel tube column, the other C-fold with a clamping mechanism inside can be situated around the opposite face of the vertical steel tube.

A further modification of this mode is to reinforce the top and bottom of the C-fold on the end of the flat plate which has the clamping mechanism. The reinforcement is by a metal plate which is secured across the C-fold end of the flat plate, preferably on the top and bottom. The reinforcement limits flexing of the 90 degree angles in the C-fold. The flat plate is made long enough to accommodate within the edges of the C-fold, the vertical column, and the reinforcement metal plate. The clamping mechanism can be retreated to be within the box formed by the reinforcement metal plate, and the flat plate and the C-fold. The reinforcement can be used on other modes of the invention to reinforce a square "L-fold," or a C-fold.

Inside at least one of the C-folds is a clamping mechanism, normally consisting of a metal piece to spread the pressure of a clamping screw, which metal piece could have an indentation in it and would be driven by a screw mounted through the selected C-fold. The clamping mechanism can be a nut welded to a screw to grip with a wrench, which screw passes through a nut welded or embedded in the C-fold through which the screw passes. The clamping mechanism includes a mechanism with a rotationally flexible or weaker end so the screw can put pressure on a clamp face applied to the face of a vertical steel tube column. A levered clamping mechanism could also be employed to direct force against a column and pull the opposite C-fold securely against the vertical steel tube analogous to the apparatus as shown in Figures 1 and 5.

When the plate, is set facing on the vertical steel tube column with the C-fold edges cupped around the end face of the vertical steel tube column, the clamping mechanism is

tightened, and one C-fold is pulled more tightly into the beam while the C- fold with the clamping mechanism grips the opposite side resulting in a firmly mounted plate on the vertical steel tube column.

In this latter fourth mode, mounted on the flat plate on the horizontal axis are perpendicular cylindrical protrusions, normally two. They support a bracket analogous to Figures 1 and 5. Alternatively, or in addition, but not as a matter of requirement, support cylindrical protrusions can be mounted on the C-folds (or L-folds) in a position which is perpendicular to the flat side and the horizontal axis and parallel to the folded face. A support plate, designed like the earlier referenced third support plate (also called a bracket plate), can be mounted on these horizontal support cylindrical protrusions either as or also as a safety plate to prevent the C-folds from spreading away from each other, or to support a bracket on a second set of protrusions. The safety plate is not required but furnishes at least a cosmetic security. In steel tube construction, the invention with cylindrical tube protrusions on the support plate or the flat plate with C-fold ends defining a first horizontal plane, and with a second set of cylindrical tube protrusions defining a second horizontal plane, is particularly useful for rapid around-the-corner mounting of deck planks. Note that with the design referenced in this paragraph for the fourth mode, the orientation of the steel tube column is immaterial as long as the C-folds will fit around one dimension of the structural column.

In the fourth mode, as before, the cylindrical protrusions may be smooth protrusions to facilitate a support bracket or deck bracket being slid on the protrusions. Normally, a retaining pin on the protrusion would prevent the support from sliding off. Alternatively, the protrusion could be a bolt. Normally, a retaining pin or a nut on the protrusion that is a bolt would prevent the support from sliding off. Ridges or notches could be used to prevent the support from sliding off. Ridges or notches can be used to prevent a deck plank or pic from sliding off the bracket.

Again, on the cylindrical protrusions which are on a horizontal axis, a horizontal bar with holes in it is mounted so the horizontal bracket protrudes out from the plate mounted on the vertical steel tube column. The horizontal bracket is then exterior of a proposed outer curtain

wall of a building. The bracket can have a deck plank placed on it and functions as a walkable deck in combination with another plate on the next H-beam over in a building. Similarly, two plates, over and under, with one protrusion could be used. However, for safety reasons, it is preferable to use two plates on each vertical steel tube, each with two perpendicular protrusions and use a bracket type of support on each set of two plates on each of at least two vertical steel tube columns. A bracket type of support could be an upper horizontal bar with holes for the cylindrical protrusions on the interior end of the upper horizontal bar with a lower angle bar with a horizontal end having holes underneath the upper horizontal bar holes, with the angle bar supporting the outside end of the upper horizontal bar. This can also be referred to as a deck support. Further bracing can be put on the bracket type of support. The horizontal bar or the bracket type of support would normally have an upturned end opposite the end with the holes to mount the bracket type of support on the protrusions on the plate to prevent a deck plank from inadvertently sliding off as seen in Figure 5. Two sets of two plates with bracket type of supports on adjacent vertical columns, and a deck plank placed on them, and a restraint on the protrusions provide a stable, mobile outrigger scaffold with deck plank which permits access to the exterior of a building to conduct activities on the outside of the building such as installing curtain wall, windows, painting and the like as seen in side view of a mounted bracket in Figure 5.

Note that the support protrusions for the support plate are therefore mounted parallel to the portion of the invention which is the front vertical face of the C-fold perpendicular to the vertical face of the flat plate which is bent to form the C-fold. The support protrusions are at the end of the front vertical face *parallel* to the horizontal axis. The support protrusions are thus also *parallel* to the flat surface of the plate. When the plate having the C-fold shaped ends is mounted on the vertical column, normally the support protrusions run parallel to the proposed curtain wall.

Particularly in the third and fourth modes and their variations, by clamping the deck planks or pics to the support brackets for the deck planks, the invention can be used on circular columns. The clamping of the deck planks reduces any likelihood that the deck support brackets on adjacent columns could move toward or away from each other.

In each of the modes, the addition of an ear tab is suggested, which is a metal hook on the clamping mechanism which rides over the top edge of the flat plate. The tab is most easily welded. The inventors prefer a tab on top and another on the bottom of the clamping mechanism hooked under the bottom edge of the flat plate. In the third and fourth mode, the inventors prefer a small cut out in the metal reinforcement plate to accommodate the ear tab which cut out is located away from the fold being reinforced in the metal reinforcement plate adjacent to where it is attached to the flat plate.

The horizontal brackets can be used to suspend ropes to hold deck planks below them, or as suggested, motorized suspension cables, or ropes for rappellers doing painting or window washing. The invention may be used for supporting or establishing a deck plank on bridge columns to assist in painting or maintenance. By securing the deck plank to the bracket, the invention is functional even on circular columns.

In yet another mode, for mounting on or suspension from an overhang, or work from a horizontal structural member, or like work, the invention is equally useful with some modification. The plates as described may be used, but the cylindrical protrusions on which a bracket is mounted must be turned 90 degrees, so the bracket remains horizontal. Alternatively, the plates as described may be used, but the bracket must have a mounting arm which is 90 degrees to the horizontal bracket. Another variation on this alternative using the plates as described is to connect the top and bottom of the mounting bracket, place apertures for mounting the brackets on the now-vertical cylindrical protrusions, and thereby enable the portion of the bracket supporting a deck plank to be horizontal.

The claims, as more fully set forth in the claims, also cover the method of manufacturing the combination, and the method of employing the elements of the invention on a building.

The embodiments represented herein are only a few of the many embodiments and modifications that a practitioner reasonably skilled in the art could make or use. The invention is not limited to these embodiments nor to the versions encompassed in the figure which is

intended as an aid to understanding the invention and is not meant to limit the disclosure or the claims. Alternative embodiments and modifications which would still be encompassed by the invention may be made by those skilled in the art, particularly in light of the foregoing teachings. Therefore, the following claims are intended to cover any alternative embodiments, modifications or equivalents which may be included within the spirit and scope of the invention as claimed.